2008 Climate Summary For Southwest Michigan

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Of the past 114 years with records available, 2008 was the 5th wettest, 37th coldest and one of the snowiest years for all of Southwest Lower Michigan. 2008 started with a cooling trend that continued through the year. Season by season, it was the coolest year since 2004. Both winter storms and severe summer storms were more active than normal. In September, the remnants of Hurricane Gustav moved north from the Gulf of Mexico and reached Lower Michigan as a tropical depression with flooding rainfall.

Severe weather was very active in Southwest Lower Michigan in 2008. In the 23 counties in the Grand Rapids forecast area, there were 231 reports of severe weather in 2008. This is a record amount for the area. Since the National Weather Service at Grand Rapids began keeping detailed records of severe weather in 1996 with the addition of the WSR-88D radar, Southwest Lower Michigan has averaged 154 events per year. Prior to the WSR-88D implementation, the average number of severe weather events per year from 1985 through 1995 was 66. The 231 events in 2008 are 151 percent of normal compared to the 13-year mean, beating the previous record of 210 events set in 2007. Prior to 2007, the record was 202 events in 1998. In a typical year there are 6 tornadoes in Southwest Lower Michigan. However in 2008, Southwest Lower Michigan recorded 10 tornadoes. This was the greatest number of tornadoes in a calendar year since the 19 tornadoes occurring in 2001. The most tornadoes recorded in a calendar year since 1950 were 23 in the super outbreak years of 1976 and 1956.

The winter months of 2008 averaged warmer than normal, wetter than normal and snowier than normal. The year opened with a snowstorm that started on the 31st of December and continued into the 1st of January. The majority of the snow from the event fell on January 1st. Up to 10 inches of snow fell just to the southwest of Grand Rapids through Jackson. That storm was a harbinger for the rest of the winter months. Even so, a week of very warm weather followed that snowstorm. The warm-up peaked on the 7th of January, with most locations in Southwest Lower Michigan reaching highs temperatures in the mid 60s. Numerous daily record highs were set on the 7th. Also, Southwest Lower Michigan's largest January severe weather outbreak (since records started in 1996) occurred on the 7th. Sixteen severe weather events were reported. It then turned cold and snowy through February. Grand Rapids had the snowiest winter (December through February) on record, with 95 inches of snow falling. Grand Rapid had snow cover continuously on the ground from the 21st of January through the 6th of March. Most other locations in Southwest Lower Michigan had exceptional snowfalls in the winter months of 2008; however only Grand Rapids broke its all-time record. Precipitation was well above normal for both January and February. January averaged more than 4 degrees above normal and tied with April for the largest positive departure from normal for any calendar month in 2008. February was colder than normal and the cold weather persisted into March.

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The spring of 2008 was quiet with near normal temperatures and below normal precipitation and snowfall. There were 35 reports of severe weather from March through May. In a typical spring, Southwest Michigan has 38 severe weather events. March reported no severe weather, compared to a typical March with an average of 3 events. On April 9th, a rare EF1 tornado occurred. Typically in April, there is at least one tornado every three years. There were 20 severe events in April. A typical April has 8 severe weather events. May had 15 severe events, compared to a normal of 26 events. While the temperature did average near normal across the area, it was one of the coolest springs since 2004.

The summer of 2008 was more active than the spring in both precipitation and severe weather. June and July were the active months for both precipitation and severe weather. August was drier than normal and quiet in terms of severe weather. Both June and July set records for the total number of severe storms for the month. June had the highest monthly event total ever recorded in Southwest Lower Michigan with 112 severe events. The previous record month was May of 2004 with 75 events. The previous June record was 69 events in 2005. July had 61 severe events. This broke the previous record of 52 events observed in July 2003. There was only one severe event in August. Like the spring, the summer averaged near normal for temperature, and was the coolest summer since 2004.

Fall of 2008 had temperatures near normal, similar to the spring and summer. Total precipitation was well above normal. Most of the heavy precipitation was due to an unusually wet September. The remnants of hurricane Gustav gave Southwest Michigan flooding rains early in the month.

There were a total of 6 severe storm events from September through December. That total was well below the average of 25 severe weather events in a typical year. There were 4 tornadoes on the 13th of September and a total of 5 severe weather events. The September average is 10 events. There was one report of severe weather in October, and this was the last severe weather event of 2008. Heavy snowfall started in mid November which is earlier than normal. Snowy weather continued through December.

TABLE 1. Reported temperature, precipitation and snowfall amounts for 2008 at selected climate stations in Southwest Lower Michigan. Normals are computed from 30-year averages from 1971-2000.

Location		Temperature (F)	Precipitation (inches)	Snowfall (inches)
Grand Rapids	*Reported*	48.3°	48.80R	143.7R
	Normal	47.6°	37.13	8.3
	Departure	+0.7°	+11.67	+1.7
Lansing	*Reported*	47.3°	35.93	86.3R
	Normal	46.8°	31.53	54.5
	Departure	+0.5°	+4.40	+31.8
Muskegon	*Reported*	47.1°	45.98R	171.9
	Normal	47.1°	32.88	105.5
	Departure	0.0°	+13.10	+66.4

R=New All Time Record Set

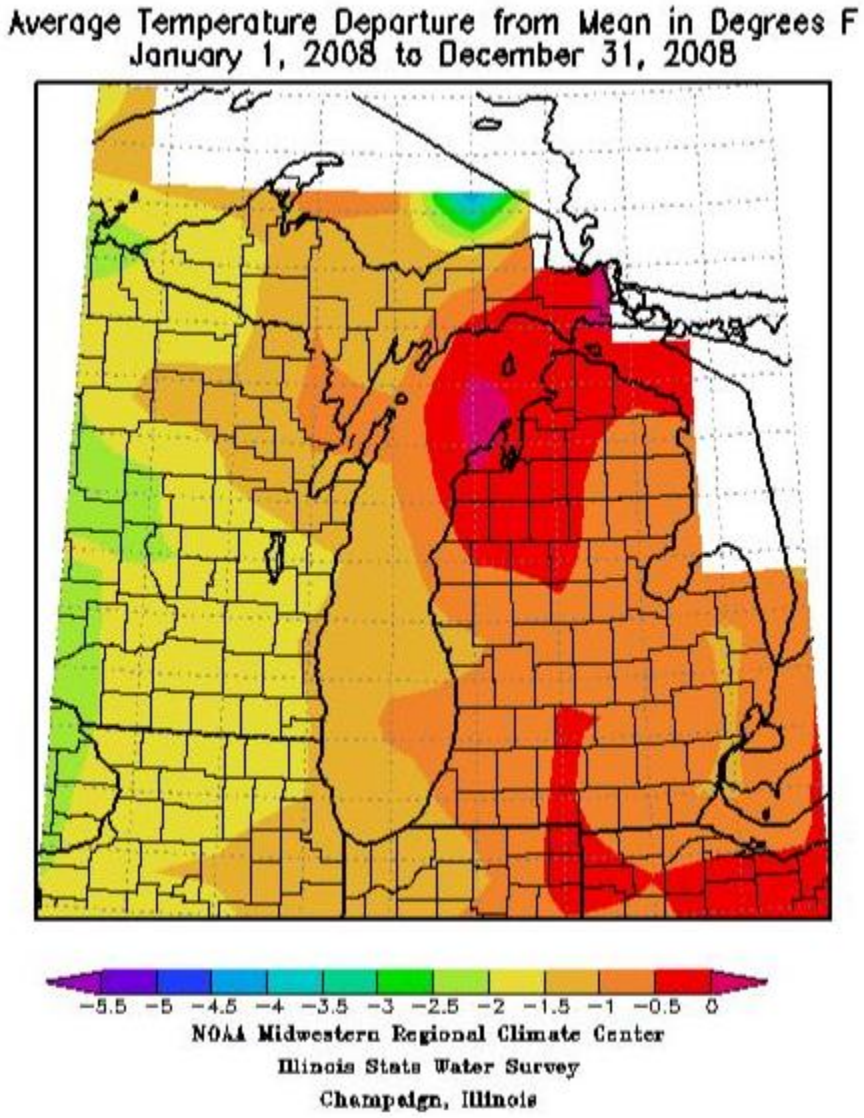

Fig. 1. 2008 Temperature Departure from Normal.

The average temperature for our 36 long term climate stations in Southwest Lower Michigan was 46.5 °. That was 0.3° below the normal mean of 46.8°. Most of Southwest Lower Michigan was between a half degree and one degree below normal (Fig. 1). The last time Southwest Lower Michigan averaged colder than normal was in 1997 when the area average was 45.7°. Looking at Fig. 2, it can be seen that for the most part colder than normal temperatures dominated Southwest Lower Michigan's weather from 1958 through 1997. From 1895 through 1955 (not shown) most years were warmer than the 1971 to 2000 normal values.

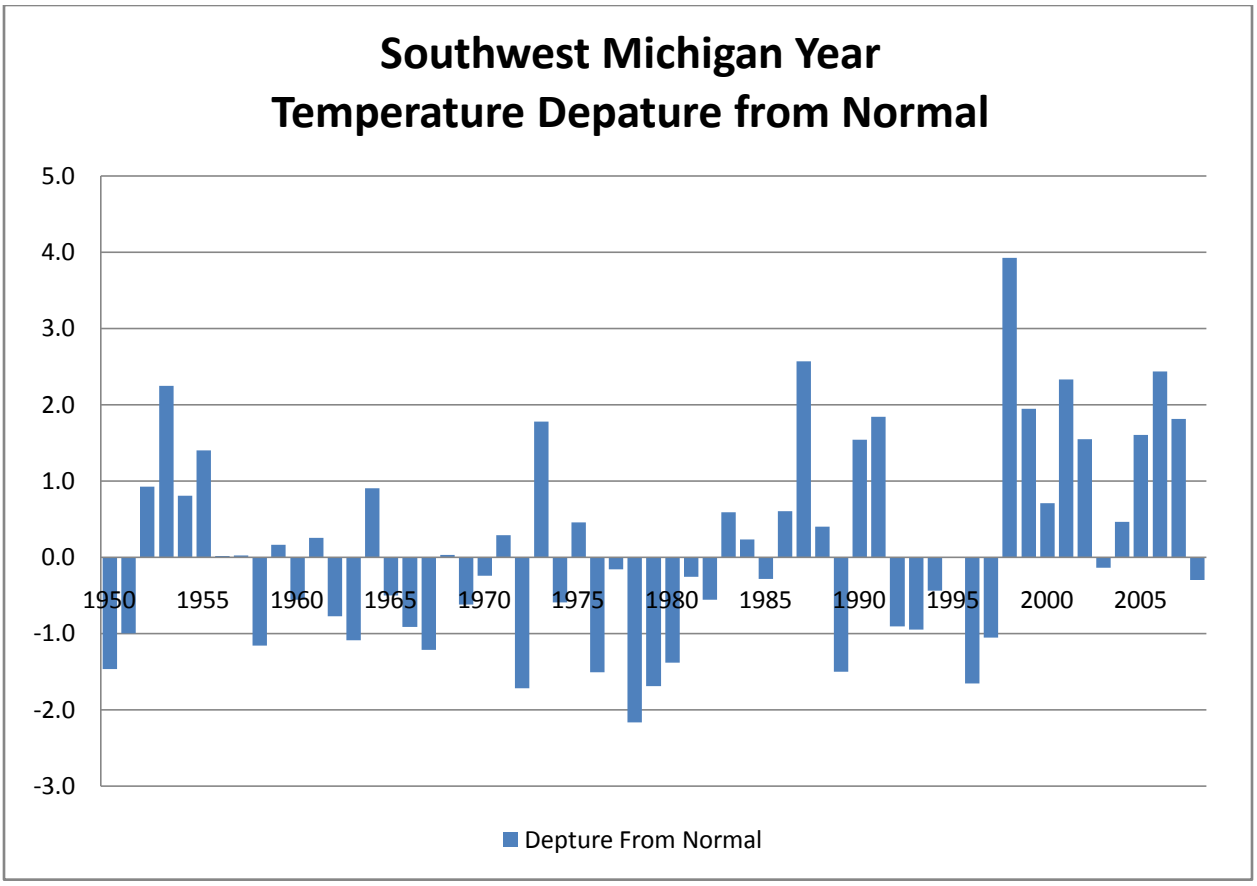

Fig. 2. The graph above shows the mean area temperature departure from normal for all of Southwest Michigan, from 1950 through 2008. There were thirty six climate stations used to come up with the yearly fall mean temperature.

Daily features in the temperature can be seen in Figs. 4 through 6. The spike in the daily high temperature to near 60° on the 7th of January can be clearly seen on each of these. The persistence of below freezing temperatures from mid January into late February also can be clearly seen. There was an unusually warm period in late April, where highs approached 80°. Note the lack of highs above 90° on any of these charts too. Total days with highs at or above 90° were the lowest since 2004. There was a record warm spell early in November that is also quite apparent in these charts. Finally, the sharply colder weather beginning in mid-November is apparent.

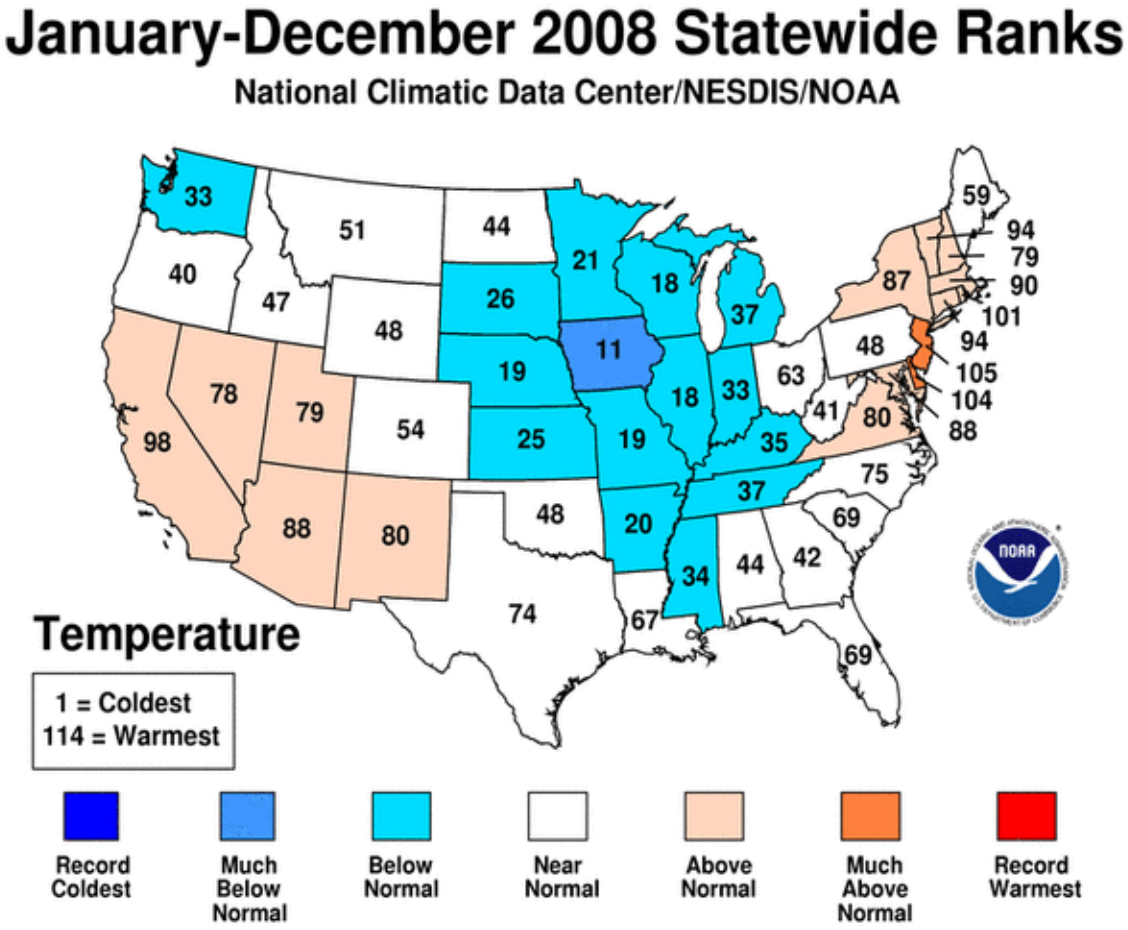

Fig. 3. NCDC State Temperature Rankings for 2008. Numbers indicate the rank relative to the 114 years of available climate data.

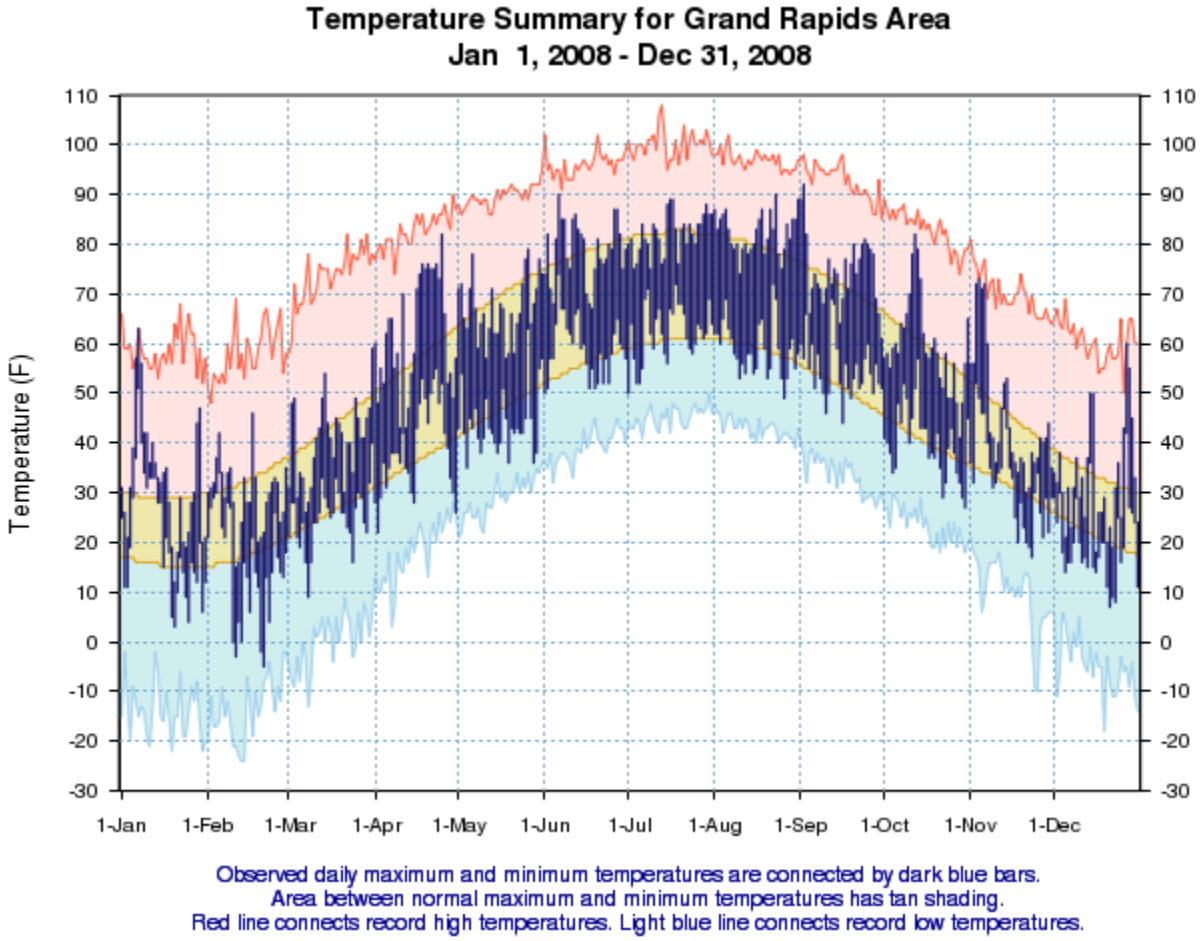

Fig. 4. 2008 Daily Temperatures for Grand Rapids.

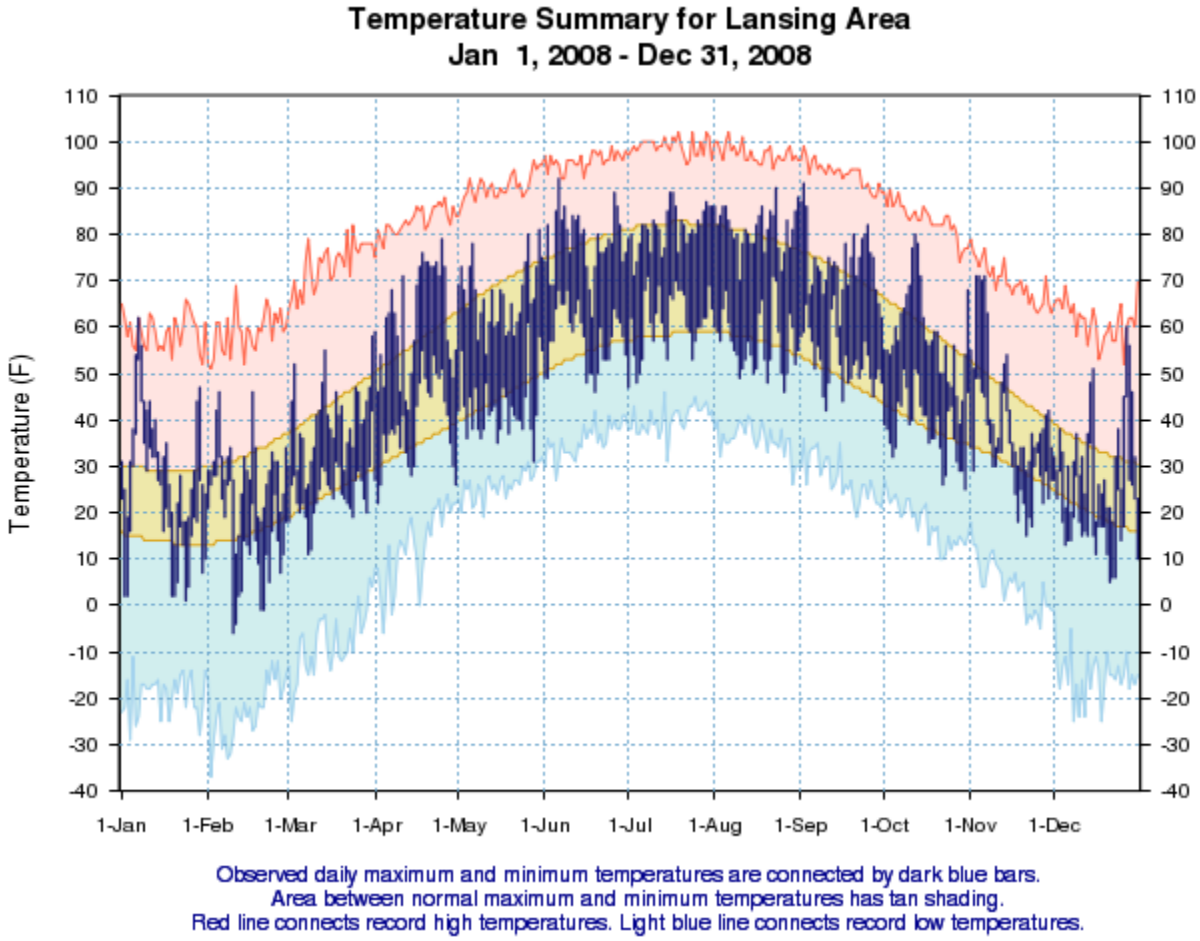

Fig. 5. 2008 Daily Temperatures for Lansing.

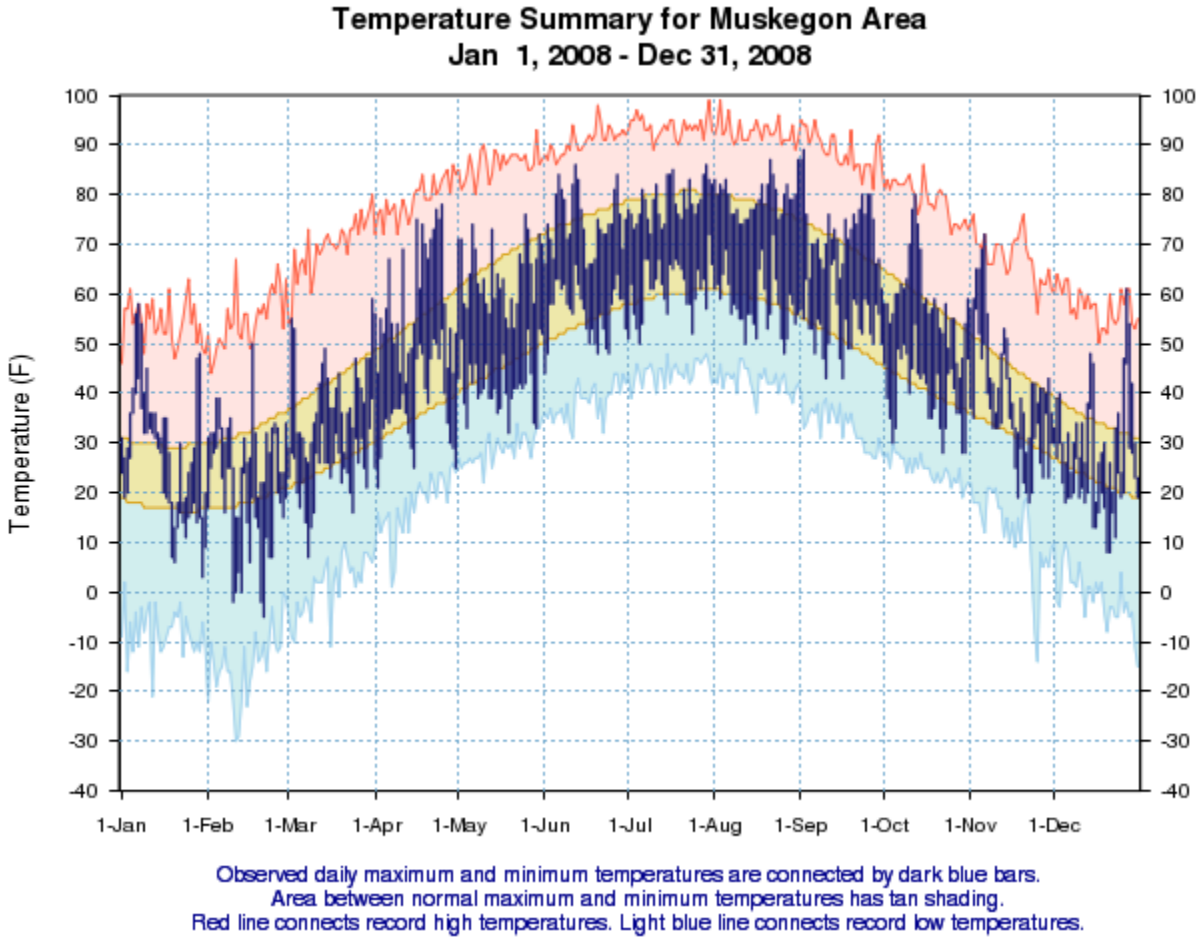

Fig. 6. 2008 Daily Temperatures at Muskegon.

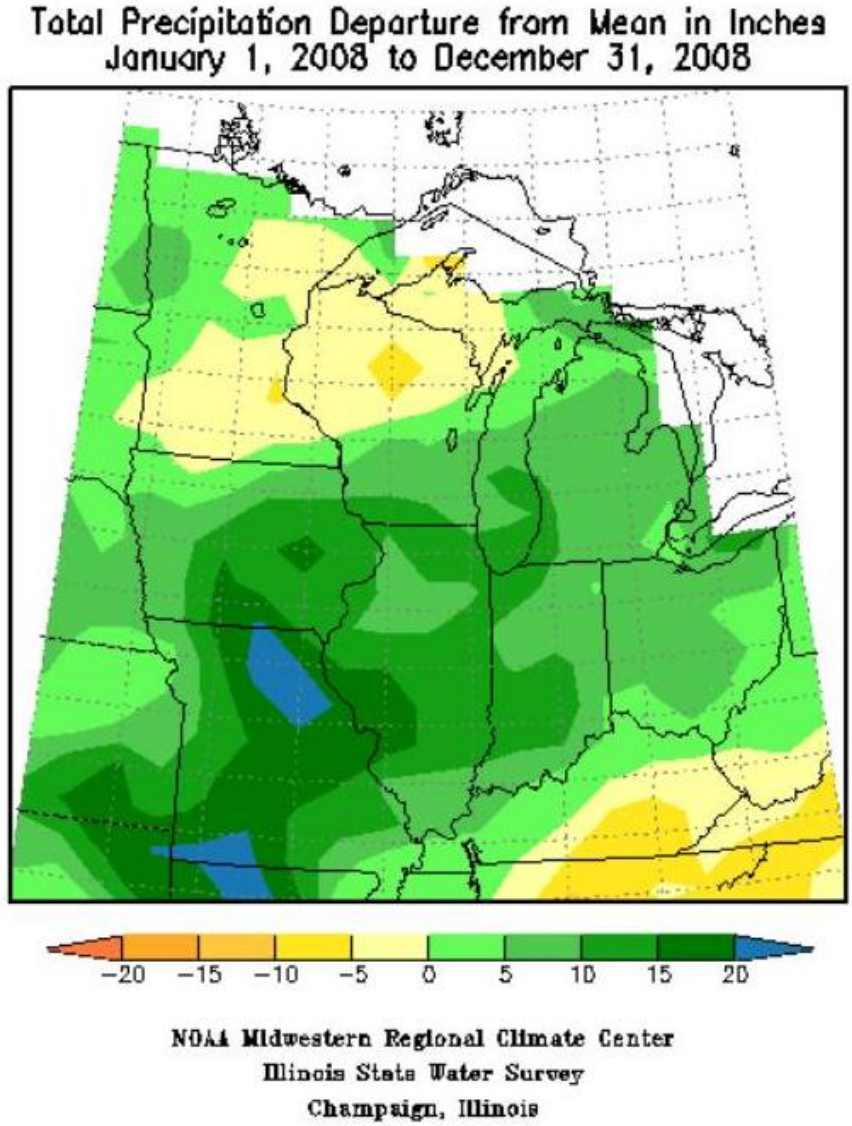

Fig. 7. 2008 Total Precipitation Departure from Normal

The year of 2008 was unusually wet. The southwest section of Southwest Lower Michigan received the heaviest precipitation relative to normal, and all of Lower Michigan was wetter than normal (Fig. 7). Grand Rapids had the wettest year on record since records started in 1892 with 48.80 inches of precipitation. That beat the previous record of 47.53 inches set in 1986. Muskegon also set its all-time record wettest year with 45.8 inches of precipitation. That bested the previous record of 42.88 inches, set in 1905. Lansing had its 7th wettest year with 36.52 inches. The record in Lansing remains at 39.74 inches from 1975. Most areas were at least 10 inches wetter than normal. Bloomingdale's 55.08 inches of precipitation was the wettest total for this area and they also set their all time record in 2008, besting the previous record 52.67 inches in 1986. Hastings recorded 50.73 inches in 2008, besting their previous record of 46.40 inches set in 1990. Hastings had the second highest total precipitation for 2008 in Southwest Lower Michigan.

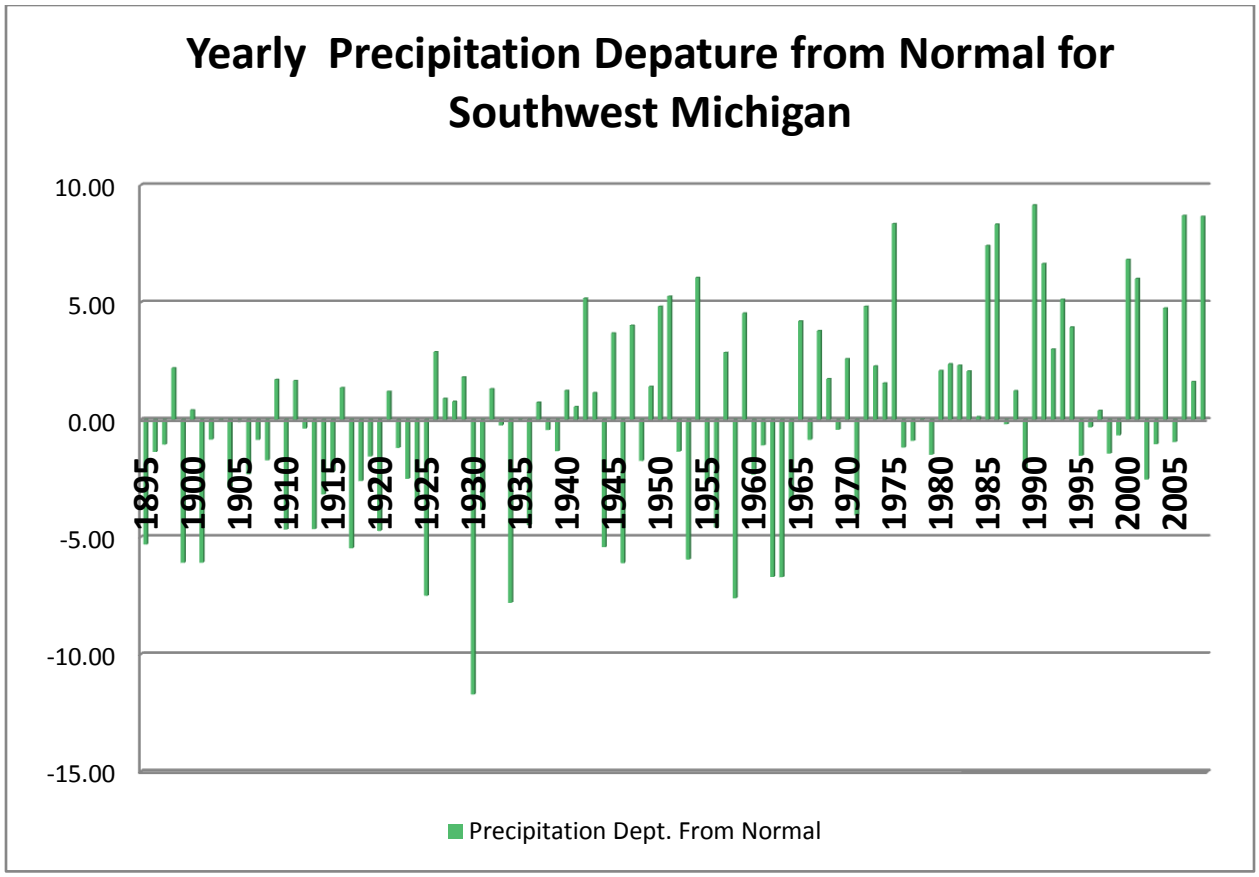

Fig. 8. Yearly Precipitation Departure from Normal. Based on all climate stations in Southwest Lower Michigan.

There has been a trend toward wetter years over Southwest Lower Michigan. This wetter trend seems to have started back in the 1940s (Fig. 8). State wide, 2008 was the 5th wettest on record (Fig. 9). The spring was the only season in 2008 with below normal precipitation; however, both the winter and fall were among top 10 percent wettest on record.

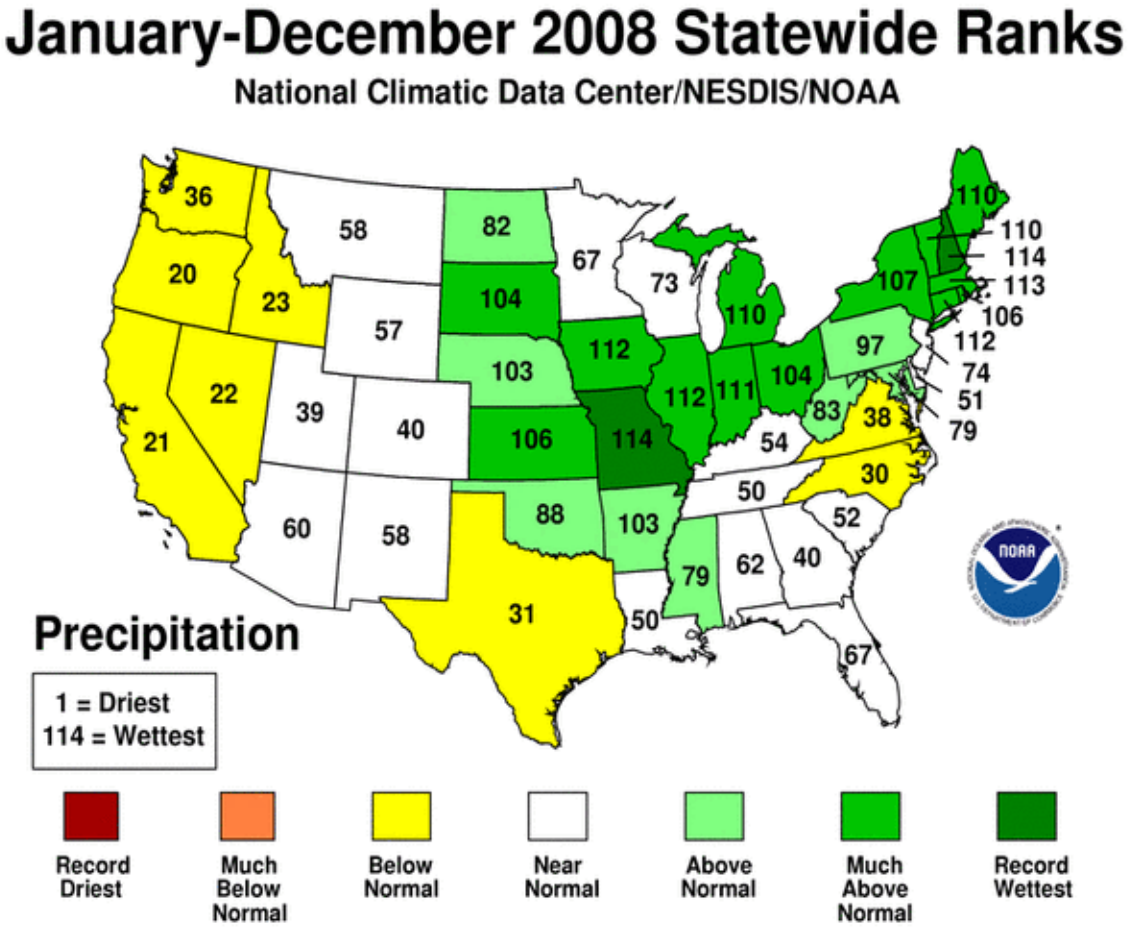

Fig. 9 As in Fig. 3, except for 2008 annual precipitation.

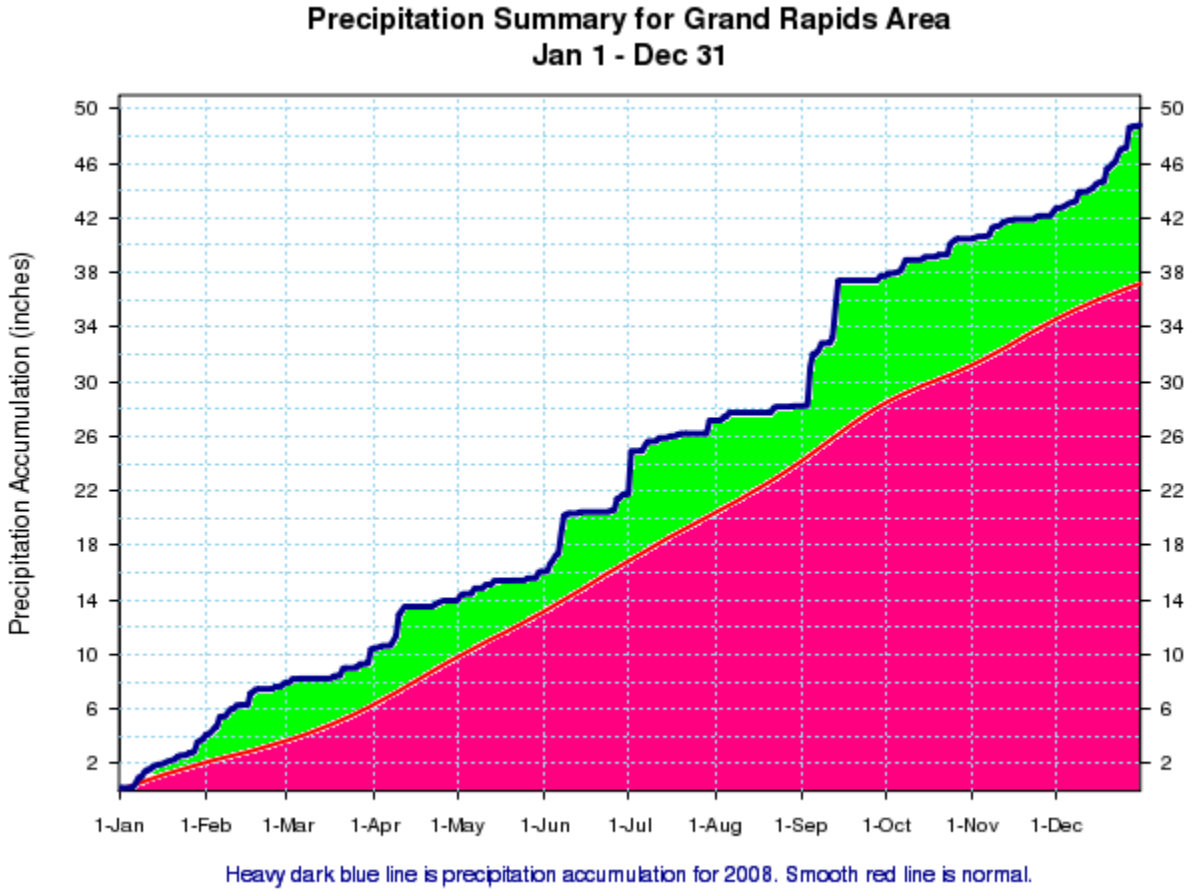

Fig. 10. Grand Rapids 2008 Accumulated Precipitation. The fuchsia curve represents the normal accumulation, and the top of the green curve is observed precipitation.

Grand Rapids was wetter than normal throughout 2008 (Fig. 10). The sharp increase in total precipitation in early September was due to Hurricane Gustav. Other spikes can be seen in early April, early June, and early in July. From mid-July through late August, the curve is almost flat, indicating a dry period.

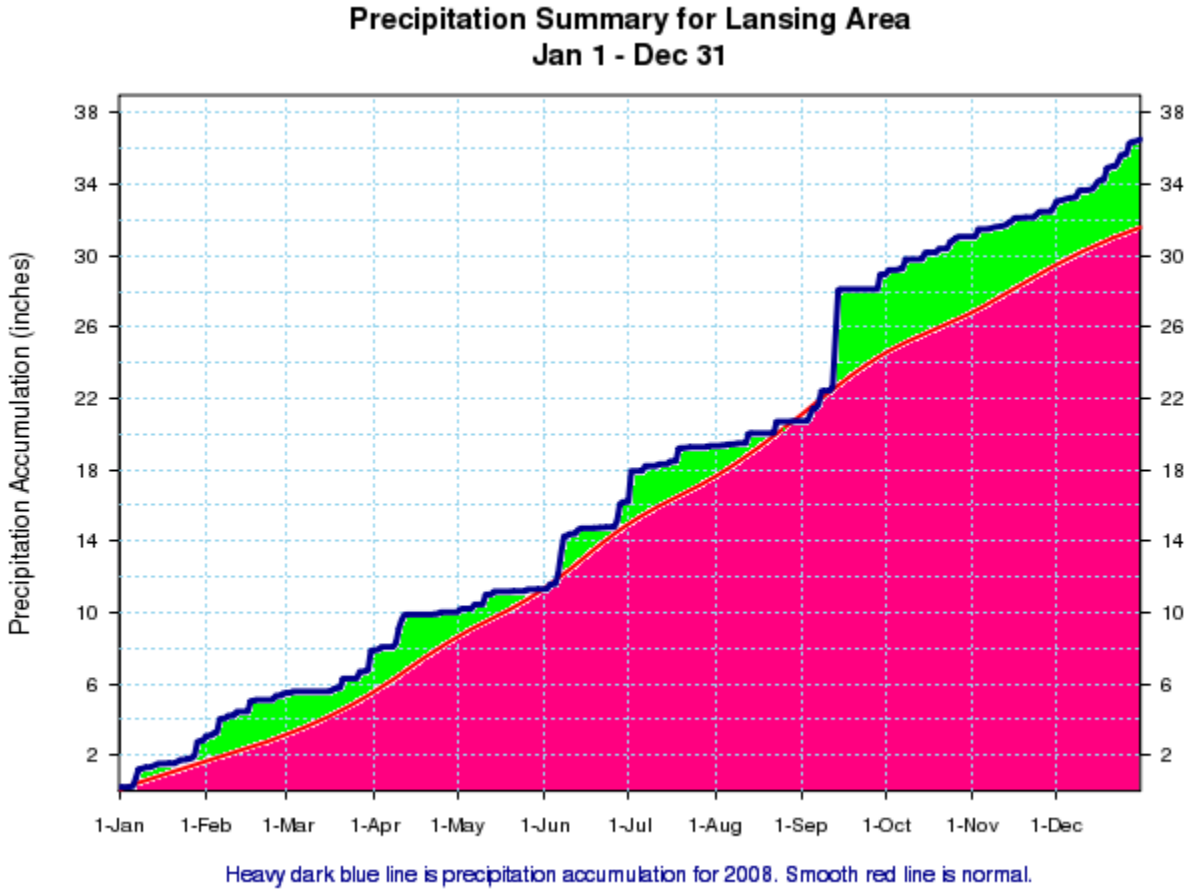

Fig. 11. As in Fig. 10, except for Lansing.

In Fig. 11, the precipitation at Lansing was closer to normal than at Grand Rapids (smaller green area on the chart). Even so, the Hurricane Gustav precipitation spike shows up here, too. As with Grand Rapids, a dry spell is seen from mid July through late August.

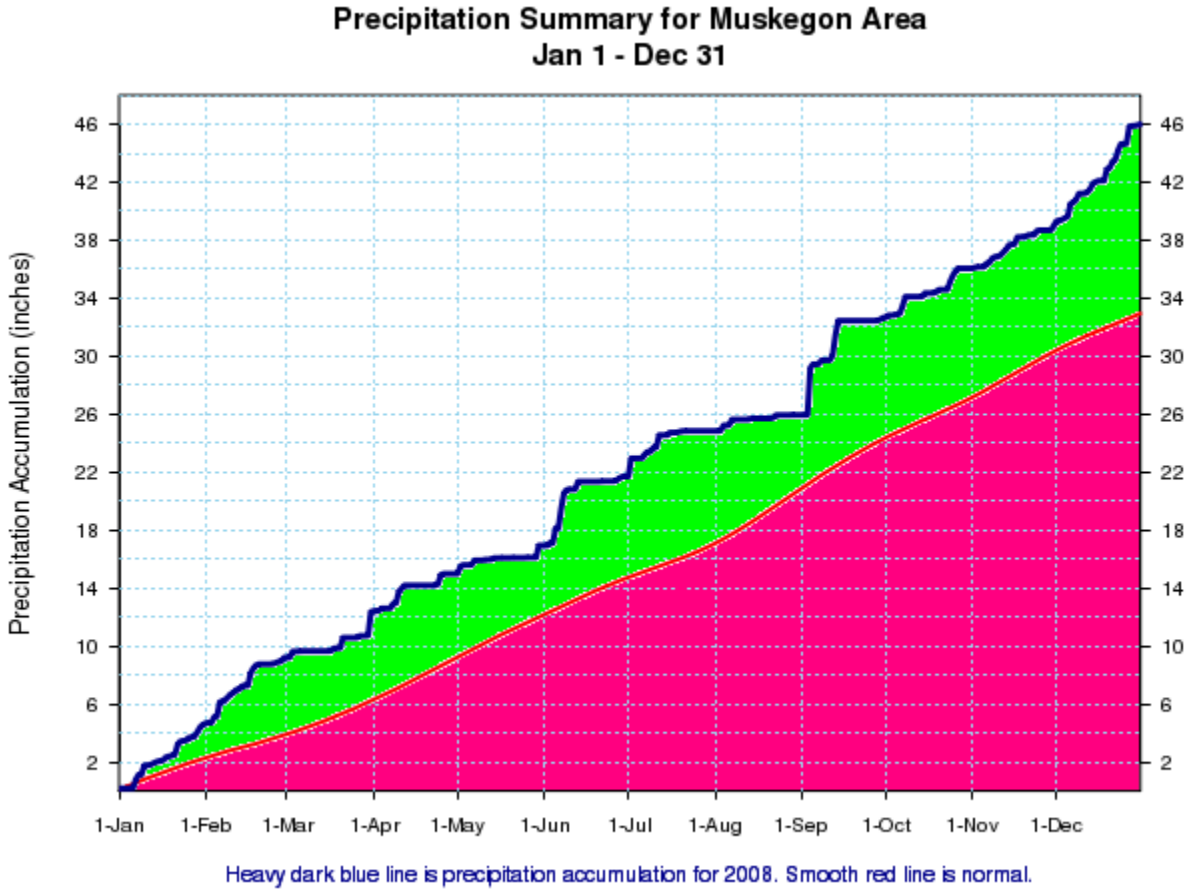

Fig. 12. As in Fig. 10, except for Muskegon.

For Muskegon, the precipitation curve looks more like the one at Grand Rapids (Fig. 12). The early June and early July precipitation spike can be seen better on the Muskegon chart than on the Lansing chart. Muskegon also shows a dry period from mid July through late August.

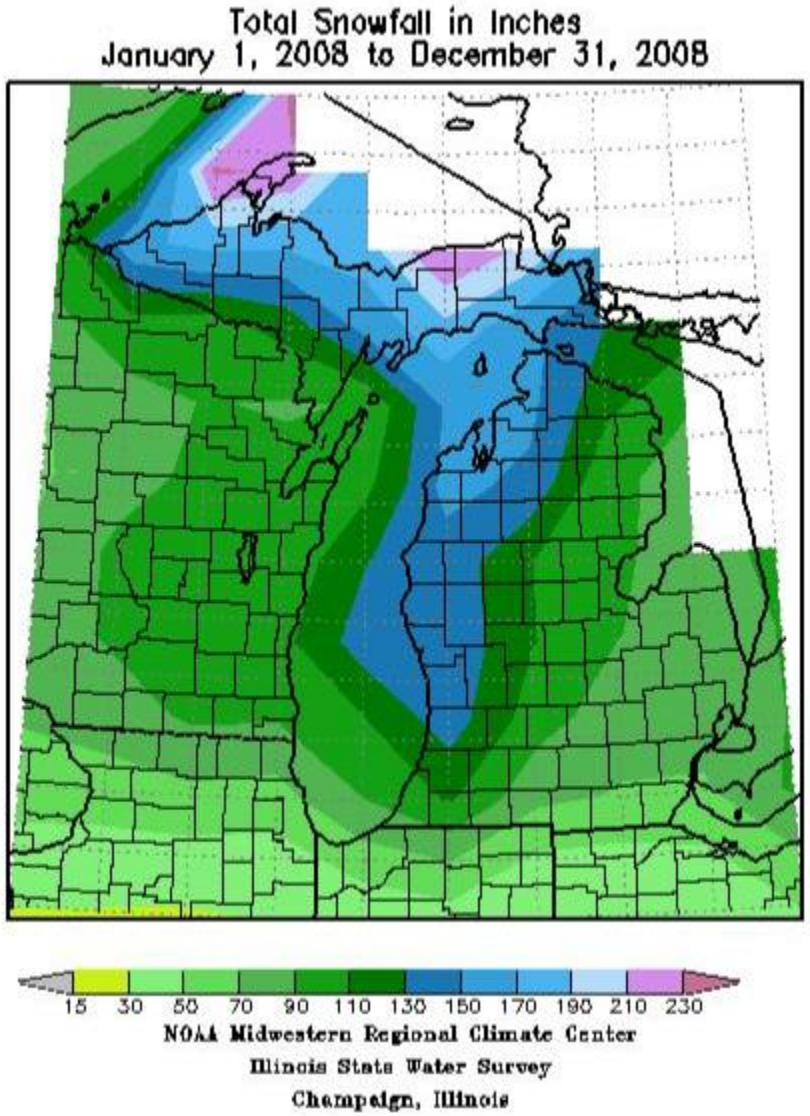

Fig. 13. The Total Snowfall for 2008 for Michigan.

In 2008, snowy weather occurred in the months of January, February, November and December. The result was well above normal snow totals across the area. Total snowfall exceeded 130 inches for most locations west of US-131 (Fig. 13). All of Southwest Lower Michigan had above normal snowfall (Fig. 14). Most of the west central section had snowfall that was more than 50 inches above normal. Bloomingdale set the record for annual snowfall total. It was also the snowiest location in Southwest Lower Michigan, receiving 196.0 inches of snow in 2008, beating the previous record of 171.2 inches, set in 1962. The 143.7 inches in Grand Rapids also set the annual record, breaking the 118.3 inch record set in 2000. Muskegon's 170.9 inches put them in third place for the snowiest year on record; their snowiest year remains 182.3 inches in 1962. Meanwhile, Lansing's total of 85.7 inches was their all-time snowiest year. That beat the 82.6 inches that fell in 2005. See the monthly summaries and storm total snow maps for details on individual snow storms.

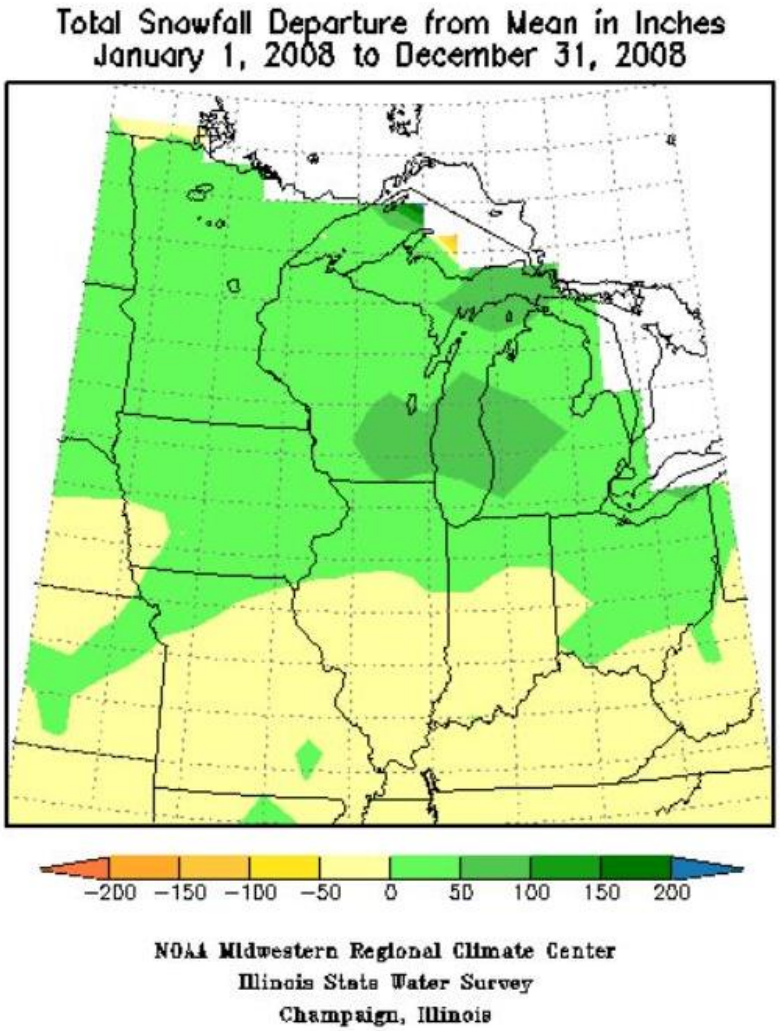

Fig. 14. Year total snowfall departure from normal for 2008.

There were 10 tornadoes in Southwest Lower Michigan in 2008. From 1986 through 2008 Southwest Michigan has averaged 6 tornadoes per year. By month, April saw one EF1 tornado, just after midnight on the 9th. June saw four tornadoes; three EF1 tornadoes on June 8th, one EF0 tornado late in the day on June 8th. July saw one EF0 tornado early in the day on the 30th. September had four tornadoes, all of which occurred on the 13th. There were three EF0 tornadoes and one EF1 tornadoes. For more details see Fig. 15, the tornado map for 2008 and the monthly weather summaries at the National Weather Service Grand Rapids webpage (http://www.crh.noaa.gov/grr/climate/).

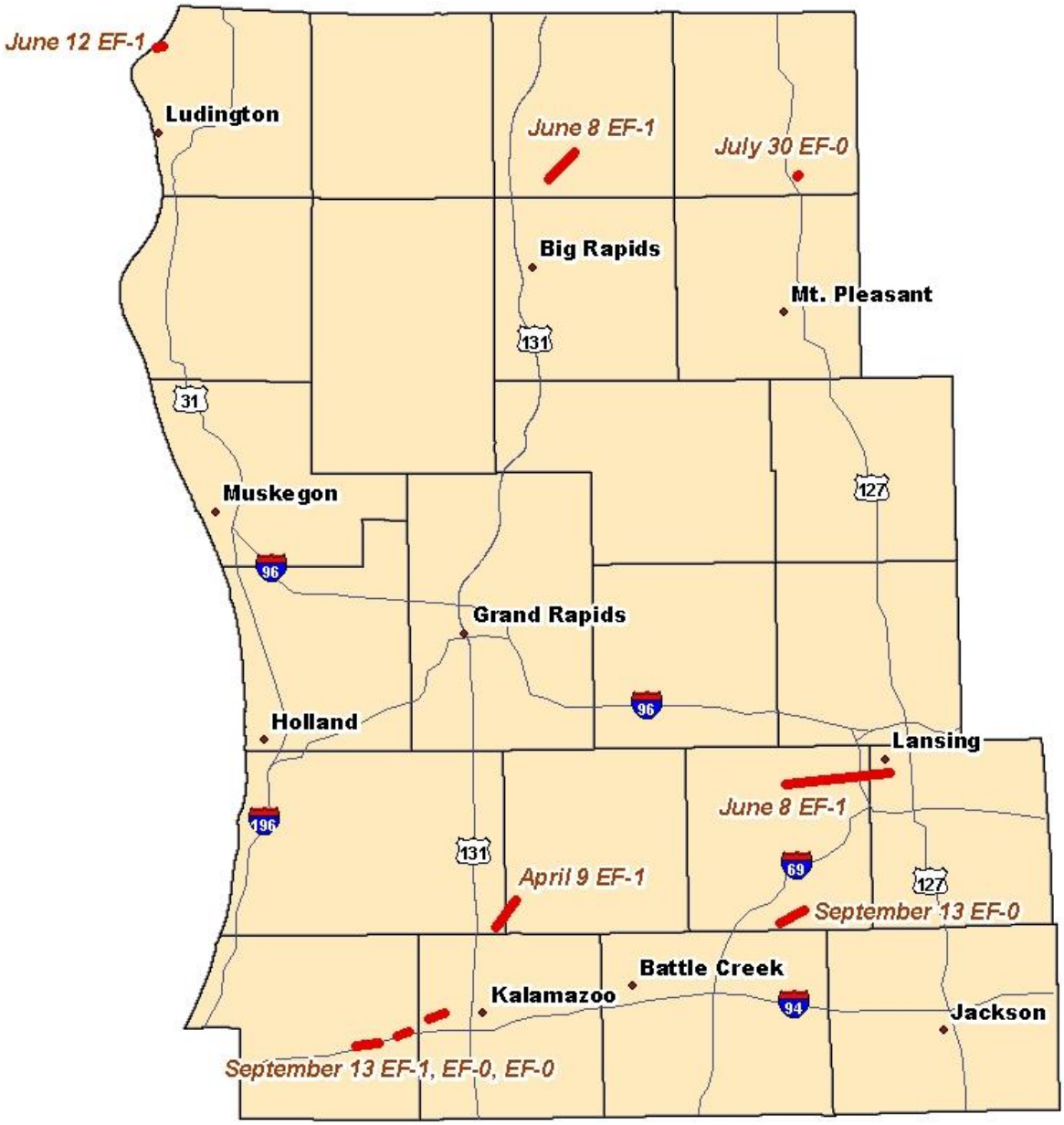

Fig. 15. Southwest Michigan Tornadoes of 2008

Three days stand out in 2008 as significant severe weather days. On June 6th from 2:50 PM until 5:45 PM, there were 33 severe storm events. Of these, 10 reports were of large hail and 23 were of wind damage events. Two days later on June 8th from 12:38 PM through 3:48 PM, 32 severe weather events were reported. There were 3 tornadoes (two by Lansing and one in Osceola County) and 29 severe wind damage reports. Finally on July 2nd, there was the largest outbreak of the season with 44 severe weather events reported between 12:45 PM and 6:25 PM. There were 23 reports of large hail and 21 reports of wind damage.